

WHAT IS CLAIMED IS:

1. An optical multiple state latching switch, comprising:
 - one or more drive actuators;
 - one or more latch actuators with associated latch teeth;
 - a flexible cantilever beam platform defining a plurality of optical waveguides;
 - a tether connecting said one or more drive actuators and said flexible cantilever beam platform;
 - a linkage defining one or more linkage teeth connecting to said one or more drive actuators located for engaging said associated latch teeth located to determine one or more latched state positions; and
 - electrical stimuli timed to actuate said one or more drive and latch actuators so as to change between equilibrium and latched states.
2. The optical multiple state latching switch according to claim 1, wherein said flexible cantilever beam platform is pulled or pushed by said one or more drive actuators.
3. The optical multiple state latching switch according to claim 1, wherein said flexible cantilever beam platform can be deflected bi-directionally.
4. The optical multiple state latching switch according to claim 1, wherein said flexible cantilever beam platform has mechanical features to increase or reduce the stiffness of said flexible cantilever beam platform.
5. The optical multiple state latching switch according to claim 1, wherein said latching switch is fabricated in the device layer of an SOI wafer.

6. The optical multiple state latching switch according to claim 1, wherein said latching switch is fabricated in the device layer of an SOI wafer and released by sacrificial etching of the buried oxide layer.

7. The optical multiple state latching switch according to claim 1, wherein said electrical stimuli to said one or more drive actuators are biased to reduce electrostatic forces acting on said actuator.

8. The optical multiple state latching switch according to claim 1, wherein said electrical stimuli to said actuators are biased to reduce or eliminate voltage differences between contacting surfaces on said latch teeth and said linkage teeth.

9. An optical multiple state latching switch, comprising:
one or more drive actuators; ✓
one or more latch actuators defining associated latch teeth;
a flexible cantilever beam platform with associated plurality of optical waveguides;
a hook-hitch for engaging said drive actuator and said flexible cantilever platform;
a linkage connecting said drive actuator to translating linkage teeth located to determine one or more latched state positions; and
electrical stimuli timed to actuate said one or more drive and latch actuators so as to change between equilibrium and latched states.

10. The optical multiple state latching switch according to claim 9, wherein said flexible cantilever beam platform is pulled or pushed by said drive actuators.

11. The optical multiple state latching switch according to claim 9, wherein said flexible cantilever beam platform can be deflected bi-directionally.

12. The optical multiple state latching switch according to claim 9, wherein said flexible cantilever beam platform has mechanical features to increase or reduce the stiffness of said flexible cantilever beam platform.

13. The optical multiple state latching switch according to claim 9, wherein said latching switch is fabricated in the device layer of an SOI wafer.

14. The optical multiple state latching switch according to claim 9, wherein said latching switch is fabricated in the device layer of an SOI wafer and released by sacrificial etching of the buried oxide layer.

15. An optical multiple state latching switch, comprising:
one or more drive actuators;
one or more latch actuators with associated latch teeth;
a flexible cantilever beam platform with associated optical waveguides;
a hitch for engaging said drive actuators and said flexible cantilever beam platform defining linkage teeth;
a linkage defining one or more linkage teeth connecting to said one or more drive actuators located for engaging said associated latch teeth located to determine one or more latched state positions; and
electrical stimuli timed to actuate said drive and latch actuators so as to change between equilibrium and latched states wherein said electrical stimuli to said actuators are biased to reduce or eliminate voltage differences between contacting surfaces on said latch teeth and said linkage teeth.

16. The optical multiple state latching switch according to claim 15, wherein said flexible cantilever beam platform has mechanical features to increase or reduce the stiffness of said flexible cantilever platform.

17. The optical multiple state latching switch according to claim 15, wherein said flexible cantilever beam platform has mechanical features to increase or reduce the stiffness of said flexible cantilever platform.